

## COURSE OUTLINE

### MATHEMATICS

The teaching of new material is always preceded by a review of each student's existing mathematical knowledge, to determine the correct level. Presentation of material is accompanied by worked examples and students then move on to applications and problem-solving exercises at an appropriate level.

Students normally enrol for one of the seven classes which are offered. The variety of Math courses available and the differing knowledge and ability of students means that no two students' needs will be identical. The teaching in Math is therefore designed to enable students to work at their own pace, on topics of their choice. Group 'workshop' sessions and individual tutorials form the basis of the teaching.

1. **Geometry and Logical Thinking**  
Introduction to abstract logic  
Proofs of Geometrical Theorems  
Parallel lines; triangles; similarity; circles; co-ordinate geometry  
More advanced Euclidean Geometry
2. **Trigonometry**  
Elementary definition of trigonometric functions  
Graphs; solving triangles including use of law of sines and cosines  
Trigonometric formulae and equations  
Radians
3. **Algebra**  
Polynomials  
Factor and Remainder Theorems  
Linear and Quadratic Equations  
Rational Functions and their graphs  
Inequalities  
Irrational and complex numbers  
Co-ordinate geometry: lines and circles  
Logarithms
4. **Advanced Algebra (Pre-calculus)**  
The concept of a function and its graph;  
domain and range of a function  
Composite functions; inverse functions  
Examples of functions: Quadratic, cubic, exponential, logarithmic, trigonometric functions  
Curve sketching of rational functions; functions involving the modulus sign  
Inequalities; complex numbers, series  
The Binomial Theorem

5. **Calculus AB**  
Review of the concept of a function and its graph  
Limits; continuity  
Differentiation, including the use of the product, quotient and chain rule  
Integration and its application to areas, volumes etc.

6. **Calculus BC**  
The concept of a limit and its rigorous definition  
Further differentiation including functions given implicitly and parametrically  
Further integration  
Differential equations  
Series expansions  
Applications of calculus to finding length of arc, area of surface, volumes

*Students taking Calculus BC should be familiar with the contents of a Calculus AB course; otherwise a Calculus AB course would be more suitable.*

7. **Probability and Statistics**  
Elementary Probability: Definitions, simple formulae, use of tree diagrams  
Probability Distributions  
Mean, variance  
Binomial Distribution  
Normal Distribution  
Poisson Distribution  
Hypothesis Testing  
Regression and Correlation

*The precise contents of the course will depend on whether the student has a knowledge of calculus.*

*There is no specified preparation or advanced reading required for any of these courses; students should, however, carefully review their mathematical knowledge, and should bring with them appropriate textbooks.*